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*NOTES UPON AGRICULTURE AND HORTICULTURE.*

SOIL IRRIGATION.

A good deal is being done in the experiment stations in the application of water to soils for purposes of crop growing.

From the last issue of the Experiment Station Record (Vol. 7, No. 6), under the head of agricultural engineering, particular mention is made of experiments in irrigation at the Utah Station. Under farm irrigation it is gathered that two feet of water is required for best results with grains upon clay soil, while a sandy soil needs three and a half feet. For wheat, clover and timothy the intervals between irrigation should be about twelve days. With spring wheat there was a decrease of yield when there were more than three waterings. Better results are obtained by day than by night irrigation. Fall watering favored timothy, but not winter wheat. The flooding system is superior to the method by furrows, and the acre-foot unit is recommended by Professor Mills for general adoption.

Under orchard and vineyard irrigation Professor Richman holds to the opinion that the best plan is to apply the water but a few times, supplying enough to reach the deeper roots of the trees. Young trees require more frequent watering than old ones, and the opinion is erroneous that water injures the trunk of trees even when confined around the base by heaped-up earth.

Among other bulletins cited is one (No. 25) from the Nevada Station, largely a compilation from publications of the Colorado and Wyoming Stations, etc., which deals with water storage measurements, pumping, etc. Another is No. 6 of the Montana Station, upon measurements of water, giving value of water, water duties and tables for discharge over weirs. Several other items are given upon this general subject from Kansas and Washington.

There is a manifest growing interest in agricultural engineering, as it relates to the distribution of water over the soil.

While irrigation has been and will continue to be a leading feature of agriculture in the arid regions of the West, there is little doubt that it will also increase in importance in the East. Field irrigation may not become a common practice along the Atlantic coast, but it seems likely that methods will be provided for supplying water to truck and berry fields when there is a shortage due to drouth.

In a small way experiments with garden crops have been carried on during the past summer at the New Jersey Station, and the results published in bulletin No. 115. From the summary the following facts are gathered: "Irrigation is quite favorable to bush beans, there being nearly three times as many pounds of pods upon the belt receiving water as elsewhere in the field, besides the quality was superior. * * * Irrigation prolonged the period of fruitfulness of peppers and the yield was nearly doubled. * * * Irrigation greatly increased the leaf development of turnips, and probably there would have been a corresponding growth of roots were it not for the clubroot which practically ruined the crop. * * * Irrigation for celery gave satisfactory results. * * * In marketable product in pounds the difference was three to one, and in marketable value eight to one, in favor of irrigation." Equally good results may be hoped for with strawberries should there be a dry spell just preceding fruiting time.

Irrigation in the greenhouse is taking shape by means of tiles or pipes with frequent outlets within the soil, that is, the various experiments at the Ohio, Cornell, West Virginia and other Stations all point toward the watering of greenhouse-grown plants from below or by what is termed sub-irrigation.

THE FIRST PRINCIPLES OF AGRICULTURE.

THE above is the title of a neat book of over two hundred pages by Edward B. Vorhees, Professor of Agriculture in Rutgers College and Director of the Experiment Stations of New Jersey. In a clear and attractive manner the important first principles of the crop growers' craft are taken up in logical order. There are fifteen chapters, beginning with the plant constituents and running through the formation of soils, their composition and improvement, and natural and artificial manures. To the latter fully a quarter of the book is devoted, there being a chapter each upon nitrogenous materials, phosphates, superphosphates and potash, salts and methods of buying, etc. Rotation of crops, selection of seed, growth of animals, feeds and fodders, principles of breeding and products of the dairy, complete the list of general subjects treated. To this is added composition and coefficient tables as an appendix, closing with an index.

The author has felt the need of a work like this in his college teaching, and in connection with his work among the farmers themselves. Prof. Voorhees believes that agriculture can be taught in the country schools and "it is here that such education must begin if it is to reach and influence the masses of farmers." With this conviction and the endorsement of the New Jersey Board of Agriculture and State Grange the work has been prepared. It is, however, a book for any farmer, for the contents deal with those general principles that know no State or country. Great stress has been laid upon fertilizers, for Prof. Voorhees, from his especially large experience in this branch of the work, sees that a clear understanding of manures, in the broad sense, and their rational use, lie at the bottom of all future successful agriculture in this country.

BYRON D. HALSTED.

*CURRENT NOTES ON PHYSIOGRAPHY.*

THE ECONOMIC IMPORTANCE OF PENEPLAINS.

THE relation of geological deposits that have economic value to physiographic conditions, ancient and modern, has often been illustrated. Coal beds record ancient lowlands with extensive marshes of imperfect drainage. In Pennsylvania the preservation of the coal now remaining is due to its having lain all through Mesozoic time out of reach of the weather, that is, beneath baselevel; for practically all the coal there is below the level of the Cretaceous peneplain of that region. Again, the limonite iron ores of the Appalachian valley are products of leaching on surfaces of low grade, the floors of Tertiary valley lowlands, now uplifted and more or less dissected. A recent essay by Hayes (16th Ann. Rep., U. S. G. S.) shows that the Georgia and Alabama pocket deposits of bauxite, the oxide of aluminum and an important source of this metal, are limited to the Tertiary lowland of the Coosa valley; thus again exemplifying the same general principle. The source of the deposits is thought to be in the underlying Cambrian shales; the faults of the regions afford paths for upward transportation; and the low grade of the former valley lowland promoted local accumulation in pockets. Similar deposits may have been formed on the more ancient Cretaceous peneplain of the region; but these have vanished with the uplift and great dissection of that lowland. Similar deposits may in future be formed when the narrow valley trenches of to-day shall have widened into broad floors. But at present the bauxite pockets are practically limited to the unconsumed portions of the Tertiary valley lowland. Hence they stand at altitudes of about 850 feet, although ranging across the bevelled edges of several thousand feet of strata. As a guide in searching for new localities, this generalization is of manifest value.